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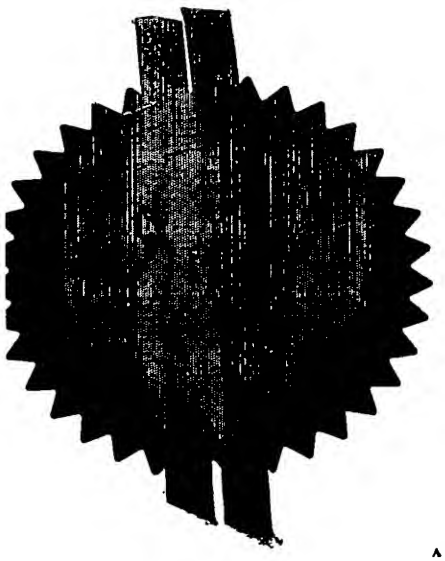
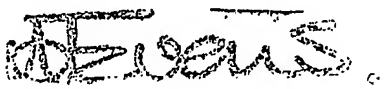


Signed 

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21 AUG 2003

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1. Your reference — PHGB030141GBQ

2. Patent application number
(The Patent Office will fill in this part) — 0319670.6

3. Full name, address and postcode of the or of each applicant *(underline all surnames)* — KONINKLIJKE PHILIPS ELECTRONICS N.V.
GROENEWOUDSEWEG 1
5621 BA EINDHOVEN
THE NETHERLANDS

Patents ADP Number *(if you know it)* — 07419294001

If the applicant is a corporate body, give the country/state of its incorporation — THE NETHERLANDS

4. Title of the invention — WIRELESS TRANSMISSION CONTROL

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)* — Philips Intellectual Property & Standards
Cross Oak Lane
Redhill
Surrey RH1 5HA

Patents ADP number *(if you know it)* — 08359655001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority Application number	Date of filing

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day/month/year)*

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a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
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Continuation sheets of this form	
Description	5
Claim(s)	2
Abstract	1
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Request for substantive examination (*Patents Form 10/77*)	
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11. I/We request the grant of a patent on the basis of this application.

Signature P J Mabey Date 21/8/03

12. Name and daytime telephone number of person to contact in the United Kingdom 01293 815576 P J MABEY

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DESCRIPTION

WIRELESS TRANSMISSION CONTROL

The invention relates to a method and apparatus for controlling transmission activity of wireless devices, particularly but not exclusively Ultra Wide Band devices.

Ultra Wide Band (UWB) technology is set to become in the next few years one of the most important means to transmit wirelessly information at a high data rate. After the FCC First Report and Order of 14th February 2002 for the US region, a new market is open for mobile data devices, a legislation is expected to follow soon also in Europe. Some of the advantages of UWB technology are unlicensed reuse of existing radio spectrum, simpler transceiver architecture, higher data rates of transmission and an accurate ranging capability.

One of the major concerns still putting in doubt the success of UWB is its capability to coexist with other services without effecting too much their operation. UWB transmission are in frequency bands already occupied by other commercial systems, such as cellular systems, microwave links and satellite links, with main frequencies of transmissions forecast to be between 3.1 GHz and 10.6 GHz, but with emissions also in other regions of the spectrum according to the power masks shown in Figure 2.

Furthermore, steps are required to minimise the power consumption of UWB chipsets to make them more competitive with other low power wireless solutions, such as Bluetooth. First generation UWB chipsets may consume in the region of 200mW, which is four to five times more that current Bluetooth chipsets.

An object of the invention is to enable a reduction of interference and a reduction of power consumption.

According to a first aspect of the invention there is provided a method of controlling wireless transmission by one or more wireless devices, comprising measuring transmission activity level of one or more wireless devices and, in response to the measured transmission activity level complying with a predetermined criterion, controlling the transmission activity of at least one of the wireless devices.

According to a second aspect of the invention there is provided an apparatus for controlling wireless transmission by one or more wireless devices, comprising measurement means for measuring transmission activity level of one or more wireless devices and control means responsive to the measured transmission activity level complying with a predetermined criterion for controlling the transmission activity of at least one of the wireless devices.

Ways of measuring the transmission activity level include measuring the proportion of transmission time over a predetermined period for one or more wireless devices, or measuring an indication of aggregate power transmitted by a plurality of wireless devices averaged over a predetermined period.

Ways of controlling the transmission activity include reducing the transmit power level of one or more of the devices, a special case of which comprises prohibiting transmission by one or more of the devices for a further predetermined time period.

The apparatus for controlling wireless transmission may be integral with a device that it controls. The apparatus may control one or more external devices by wireless communication.

The invention is based on the realisation that for wireless electronic devices that are in active use, and therefore transmit, for only a fraction of the maximum theoretical time, and perfoming temporal averaging and control is a practical way of controlling interference levels, and also enables power consumption to be reduced. In this specification, the apparatus for controlling the transmission activity is also referred to as an activity factor controller.

The invention will now be described, by way of example only, with reference to the accompanying drawings wherein:

Figure 1 is a block schematic diagram of a cluster of wireless devices;

Figure 2 is a graph showing FCC Report and Order and ETSI draft spectrum masks for transmissions by UWB communication devices in indoor situations;

Figure 3 is a graph showing simulation results for the aggregate interference effect from UWB to a FWA hot-spot link with different activity factors.

Figure 4 is a graph showing simulation results for the aggregate interference effect from UWB to a FWA point-to-point link with different activity factors.

The activity factor controller can be implemented in two different ways:

a) Embedding the activity factor controlling functionality into the controlled device (so controlling and controlled functions are living within the same device). The device's microcontroller will simply records the quantity of transmission activity registered in the last period and display the updated remaining time-to-air to the user. An active control checks that a fixed threshold is not reached within a predefined period. The consequence of reaching some intermediate levels (between zero and the maximum allowed usage) might be similar to what already shown today by battery control techniques. As an example, after reaching 50% of the maximum power allowed in the day, the activity factor controller might intervene automatically reducing the power of transmission (and consequently the interference to outside services). In data transfers mechanisms this might mean a slightly longer wait for file transfers. In sensing applications, a lower refresh rate of the system, in video transmission systems, might mean for example the switch to a lower resolution mode if the actual quality of service (QoS) cannot be maintained with the new (reduced) allowed power. In the case of the

transmission reaching the 100% of its allowed daily limit, the activity factor controller will switch off completely the UWB radio transmitter.

b) This temporal average usage control can also be implemented via external master units checking and enabling the total traffic in a home. This activity factor control unit might base its decision on priorities assigned by the user on his/her daily needs and changeable up to the maximum level allowed for each class of services. In such an environment the activity factor controller would dynamically calculate the aggregate power emitted by the pool of devices it is controlling and adjust them to make sure they do not exceed the preset limits, for example switching off or reducing the quality of service of lower-priority radio devices first. This activity factor controller unit might also receive special updates and have its limits sets in base to the area where it is used. In fact, while the aggregate interference power might be of concern for a large building which sits in close proximity to a FWA microwave link, it should have no noticeable influence on small homes or countryside places where only a small number of devices are used.

The radio-emission limits might also be automatically updated or set into the activity factor controller also based on the coordinates of its location (entered by the user or automatically retrieved via a GPS or other location mechanism device that can provide this information to the controller). In an ideal and perfectly connected situation, these updates might also arrive from a central database UWB radio controller station, which monitors in real time the effects of interference in key areas that are vital and need suitable protection, as vital microwave relay links in disaster areas (to keep the communications active and disable the UWB devices with low priorities).

Referring to a Figure 1, there is illustrated a cluster of UWB wireless devices 10 and an activity factor controller 20 comprising a measurement means (M) 22 for measuring transmission activity level and a control means (C) 24 for controlling transmission activity. Optionally the activity factor controller 20 comprises a location means (L) 26 for determining the location of the activity factor controller 20.

Simulation results illustrating the reduction in interference power obtainable by reducing the activity level in accordance with the invention are illustrated in Figure 3 and 4.

In the present specification and claims the word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. Further, the word "comprising" does not exclude the presence of other elements or steps than those listed.

The inclusion of reference signs in parentheses in the claims is intended to aid understanding and is not intended to be limiting.

From reading the present disclosure, other modifications will be apparent to persons skilled in the art. Such modifications may involve other features which are already known in the art of UWB and the art of wireless communications and which may be used instead of or in addition to features already described herein.

CLAIMS

1. A method of controlling wireless transmission by one or more wireless devices (10), comprising measuring transmission activity level of one or more wireless devices (10) and, in response to the measured transmission activity level complying with a predetermined criterion, controlling the transmission activity of at least one of the wireless devices (10).

2. A method of controlling wireless transmission as claimed in claim 1, wherein measuring the transmission activity level comprises measuring the proportion of transmission time over a predetermined time period

3. A method of controlling wireless transmission as claimed in claim 1, wherein measuring the transmission activity level comprises measuring an indication of aggregate power transmitted by a plurality of the wireless devices (10) averaged over a predetermined time period

4. A method of controlling wireless transmission as claimed in any of claims 1 to 3, wherein controlling the transmission activity comprises reducing the transmit power level of one or more of the devices (10).

5. A method of controlling wireless transmission as claimed in claim 4, wherein the reduction in power level comprises prohibiting transmission by one or more of the devices for a further predetermined time period.

6. A method of controlling wireless transmission as claimed in any of claims 1 to 5, wherein the predetermined criterion is location dependent.

7. Apparatus (20) for controlling wireless transmission by one or more wireless devices, comprising measurement means (22) for measuring transmission activity level of one or more wireless devices (10) and control

means (24) responsive to the measured transmission activity level complying with a predetermined criterion for controlling the transmission activity of at least one of the wireless devices (10).

8. Apparatus as claimed in claim 7, wherein the measurement means (22) is adapted for measuring the transmission activity level as the proportion of transmission time over a predetermined time period

9. Apparatus as claimed in claim 7, wherein the measurement means (22) is adapted for measuring the transmission activity level as an indication of aggregate power transmitted by a plurality of the wireless devices (10) averaged over a predetermined time period

10. Apparatus as claimed in any of claims 7 to 9, wherein the control means (24) is adapted to control the transmission activity by reducing the transmit power level of one or more of the devices (10).

11. Apparatus as claimed in claim 10, wherein the control means (24) is adapted to control the transmission activity by prohibiting transmission by one or more of the devices (10) for a further predetermined time period.

12. Apparatus as claimed in any of claims 7 to 11, wherein the control means (24) is adapted to control the transmission activity by transmitting a control command to one or more of the devices (10).

13. Apparatus as claimed in any of claims 7 to 13, wherein the measurement means (22) is adapted vary the predetermined criterion in response to data indicative of the location of the apparatus.

16. Apparatus as claimed in claim 15, comprising location means (26) adapted to generate the data indicative of the location of the apparatus.

ABSTRACT

WIRELESS TRANSMISSION CONTROL

Wireless transmission by one or more wireless devices (10) is controlled by measuring transmission activity level of one or more of the wireless devices (10) and, in response to the measured transmission activity level complying with a predetermined criterion, controlling the transmission activity of at least one of the wireless devices (10).

(Figure 1)

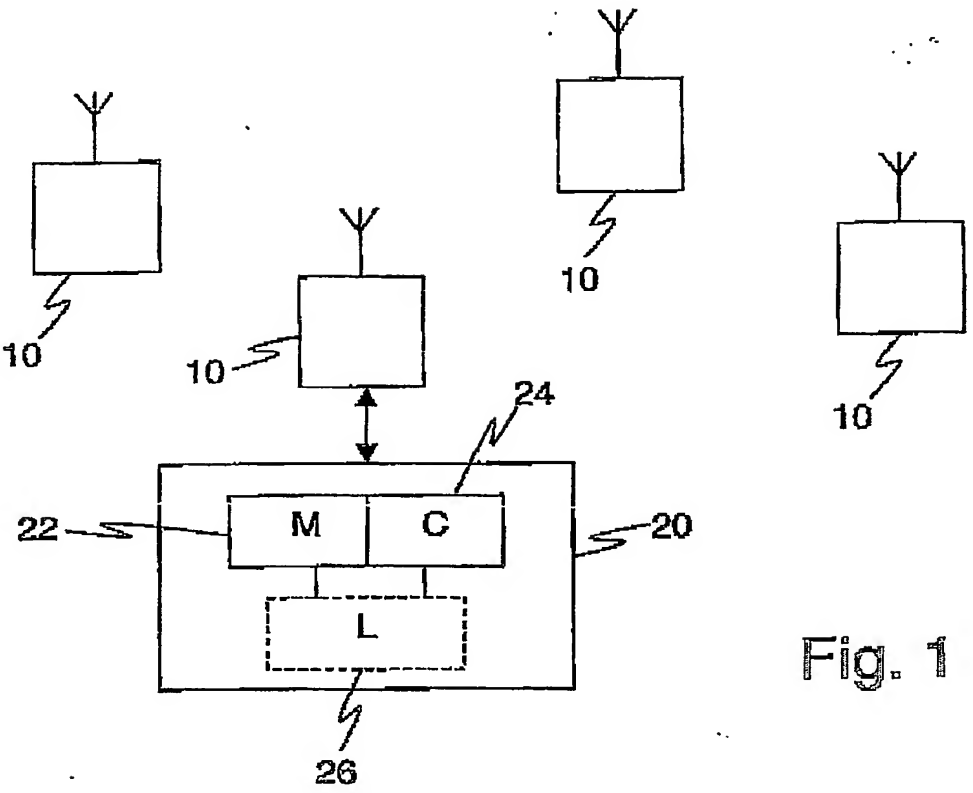

Fig. 1

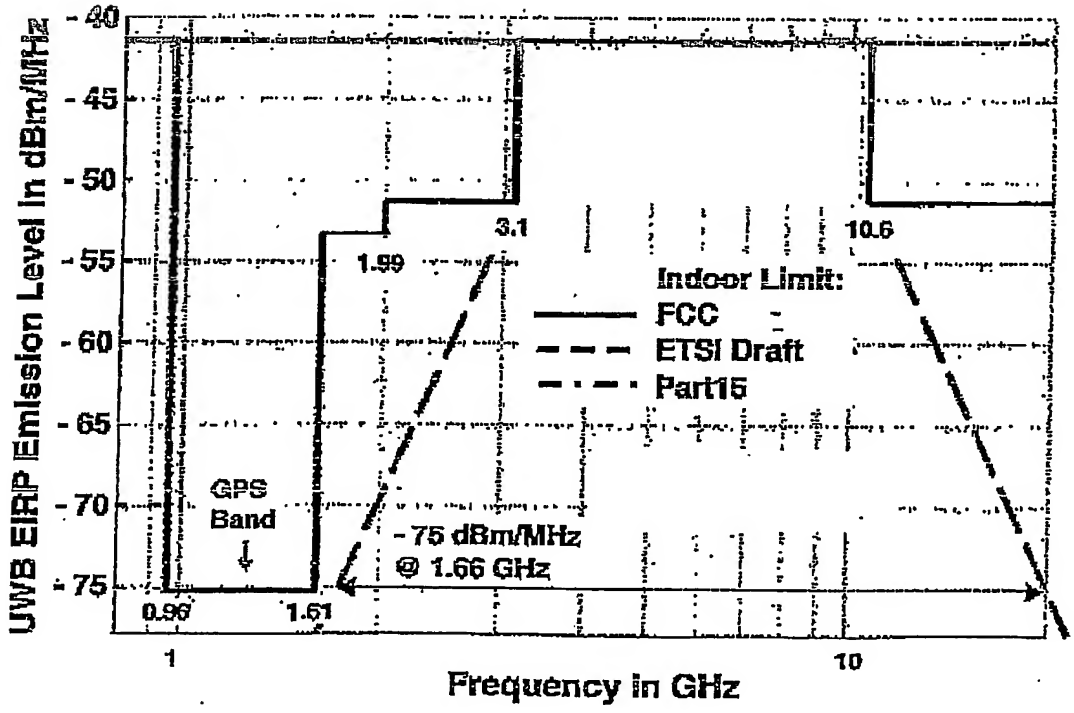

Fig. 2

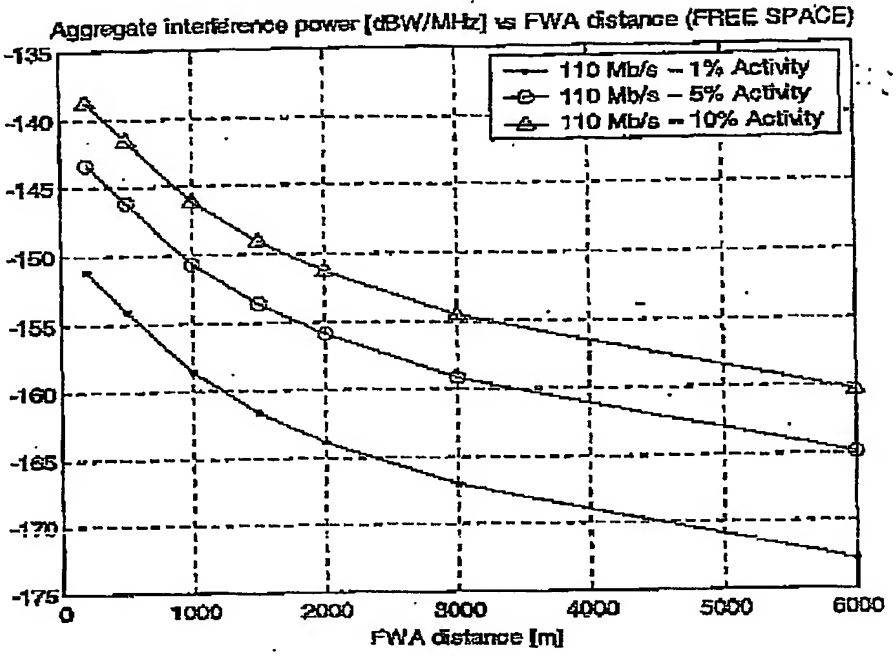

Figure 3: Aggregate interference effect from UWB to a FWA hot-spot link with different activity factors. The lower the activity factor, the lower the interference.

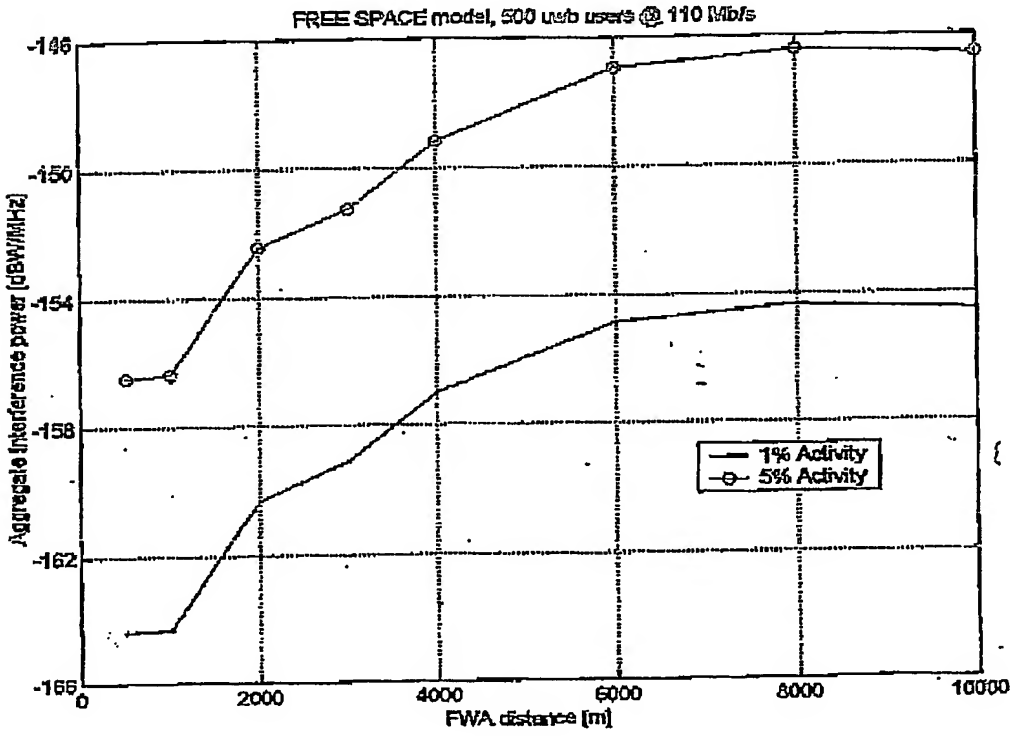

Figure 4: Aggregate interference effect from UWB to a FWA Point-to-point link with different activity factors. The lower the activity factor, the lower the interference.

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